American Journal of Medical Quality

Communicating Hospital Infection Data to the Public: A Study of Consumer Responses and Preferences

Kathleen M. Mazor, Katherine S. Dodd and Laureen Kunches

The online version of this article can be found at:
http://ajm.sagepub.com/cgi/content/abstract/24/2/108

Additional services and information for *American Journal of Medical Quality* can be found at:

Email Alerts: http://ajm.sagepub.com/cgi/alerts

Subscriptions: http://ajm.sagepub.com/subscriptions

Reprints: http://www.sagepub.com/journalsReprints.nav

Permissions: http://www.sagepub.com/journalsPermissions.nav

Citations http://ajm.sagepub.com/cgi/content/refs/24/2/108

Communicating Hospital Infection Data to the Public: A Study of Consumer Responses and Preferences

Kathleen M. Mazor, EdD
Katherine S. Dodd, BS
Laureen Kunches, ANP, PhD

There is growing interest in public reporting of health care performance data relating to healthcare-associated infections (HAIs). This study evaluated different approaches for reporting hospital-level comparative data on HAIs and the extent to which such data might influence hospital choice. Eight versions of a report were developed, varying whether data were consistent across indicators, whether data were presented in text or graphs, and whether confidence intervals were included. A report and a questionnaire were mailed to a randomly selected sample of local residents. Findings provide no evidence that consistency of indicators, data presentation, report format, or inclusion of confidence intervals significantly impacted consumers' understanding. More educated consumers reported greater understanding of the reports. Responses suggested that public reporting of comparative data on HAIs could influence hospital choice, but other factors including prior experience, reputation, physicians' recommendations, and insurance coverage are also influential. Most consumers understand information on HAIs when it is presented in a short, simple report, and most correctly select the best or worst hospital. Consumers may be influenced by such data, but other factors are likely to be as or more important. (Am J Med Qual 2009;24:108-115)

Keywords: quantitative research; comparative data; public reporting; healthcare-associated infections

Public reporting of health care performance data has become increasingly prevalent in recent years.[1,2] Given the resources and attention that have been devoted to public reporting efforts, it is perhaps surprising that evidence of the effectiveness of these efforts is limited.[2,3] The most recent systematic review[2] of the empirical literature on the relationship between public reporting and quality improvement in this area identified 45 articles published between 1986 and 2006, but determined that findings from these studies were inconclusive and provided mixed signals on the impact of public reporting. This review also identified significant gaps in the literature in this area, including a dearth of research into the causal pathways whereby reporting influences health care quality, as well as into the impact of report design and implementation.

The following 3 distinct but related pathways have been suggested as avenues through which public reporting of performance data may influence health care quality: the selection pathway, the change pathway, and the reputation pathway.[4,5] In the selection pathway, consumers' use of performance data in selecting health plans, hospitals, or providers has the potential to directly affect market share, thereby motivating an organization or individual to improve performance. Similarly, pay-for-performance initiatives with public reporting have the same motivation—they seek to encourage providers to improve performance through incentives under the presumption that improved performance will increase market share.[2] The change pathway is in effect when feedback on

deficits or problems is sufficient to motivate changes that lead to improvements in care. The reputation pathway is in effect when health plans, hospitals, or providers are motivated to improve their performance to maintain or improve their public image or reputation (which presumably is also related to market share).[4,5] It is worth noting that consumers do not need to know or comprehend performance data for public reporting to influence health care performance through the selection pathway, as consumer advocates, purchasers, and other third parties may serve as intermediaries to consumers who are making selections. Similarly, for the reputation pathway to be effective, consumers need only form a global impression of the reputation of an entity. They do not need to know or understand the data that forms the basis for that reputation.[4,5]

The fact that public reporting may have an impact even if consumers do not access or use the reports is not, however, justification for ignoring report design issues and the consumers' perspective. To the contrary, it has been argued that inconsistent execution of public reporting efforts and lack of attention to report design issues may help to explain the inconsistent findings with regard to impact.[4] Hibbard has identified 3 elements as necessary to successful public reporting: (1) reports must be widely disseminated, (2) it must be known that subsequent public reports will follow, and (3) the reports must be highly evaluable for consumers (ie, consumers must be able to understand the information presented).[5,6] Ultimately, if information is presented in such a way that it is accessible and comprehensible it is more likely to be used by consumers and their proxies, and therefore to have an impact.

The challenges inherent in public reporting of performance indicators in general are also challenges for public reporting of healthcare-associated infection (HAI)-related indicators, but reporting about HAIs poses unique challenges. As states work to create mechanisms for public reporting, much attention is being paid to developing standardized processes for identifying, counting, and reporting HAIs. Appropriate methods of risk adjustment are needed to ensure that reporting is fair and that hospitals that treat high-risk patients or perform high-risk procedures are not unduly handicapped.[3] Risk adjustment is important in this context because the types of patients hospitals serve and the types of procedures hospitals perform have

a substantial impact on the likelihood of patients developing HAIs. This does not mean that hospital effects can be ignored. Hollenbeak and colleagues have documented hospital fixed effects, highlighting that whether a patient develops an infection is a function of susceptibility and exposure.[7] However, comparisons of raw data (ie, unadjusted infection rates) across hospitals with wide variations in patient populations would be misleading and could potentially disadvantage hospitals that serve high-risk patients or conduct high-risk procedures, which could discourage hospitals from serving these patients.[3] Not surprisingly, the complexities inherent in gathering and reporting data on HAIs have led to concerns about whether consumers will be able to appropriately interpret such data, especially if doing so requires understanding difficult concepts such as risk adjustment.

Concerns about the difficulties inherent in communicating concepts, such as infection rates and mortality rates, are well founded in light of the evidence that many people—even well educated people—have difficulty understanding numbers and interpreting data.[8,9] In addition, the concepts that are central to expert models of HAIs (ie, risk adjustment) are likely to be particularly difficult for lay people.[3] But limited numeracy is not the only barrier to effective public reporting of HAIs. A recent qualitative study explored consumers' perceptions of 18 quality indicators, including HAIs.[10] Findings suggested that most indicators are not well understood by the majority of consumers. Misunderstandings and incorrect interpretations were common and were even greater for negative indicators, such as HAIs, in spite of the fact that 79% of respondents had at least 1 year of college. Finally, although there has been relatively little research on how data should be presented to consumers, the research that has been conducted clearly demonstrates that consumers are influenced by how performance data are displayed, even when they are not aware of such influences.[11] Findings such as these underscore the need to engage stakeholders, including consumers, in developing and evaluating public reporting efforts, and to systematically evaluate what type of reporting works best under what circumstances.[3,12,13]

The purpose of the present study was to evaluate consumers' responses to different approaches in reporting hospital-level comparative data on HAIs. Using an iterative development process, which included in-depth qualitative interviews

with local residents about existing reports, we developed a sample report that presented HAI-related performance data for 4 pseudonymous hospitals.[14] Eight different versions of the sample report were created for the present study to examine how 3 factors (ie, consistency of the data across indicators, presentation style, and inclusion of confidence intervals) influenced consumers' evaluations of the report and their decision making in a hypothetical situation. We also explored whether several variables, including data on HAIs, would influence hospital choice.

METHODS

This study utilized a cross-sectional survey. A random sample of residents of the city of Worcester, Massachusetts was selected from a publicly available list maintained by the city clerk's office. The first mailing described this study, noted that a second mailing with a questionnaire would follow, and provided "opt out" information for those who wished to decline participation. The second mailing included a cover letter, gift certificates to Dunkin' Donuts, a sample report, and the questionnaire. Nonresponders were sent a reminder approximately 2.5 weeks later. A final mailing to nonrespondents containing a replacement copy of the questionnaire was sent 3 weeks later. The study was approved by the University of Massachusetts Medical School Institutional Review Board.

MATERIALS

Sample Reports

Eight versions of the report were created and each version was assigned at random. Each report included the same brief introduction to HAIs on the cover page entitled "What is a healthcare-associated infection?" This section reported overall rates of HAIs (eg, "Some sources estimate that as many as 1 in 20 patients develop a Healthcare-Associated Infection") and introduced the potential consequences associated with contracting an HAI (ie, isolation to prevent further spread of infection, development of a serious or life-threatening illness, or a longer than anticipated hospital stay). Three indicators were reported inside the booklet: (1) a safe practice score, (2) an infection rate, and

(3) a mortality rate was reported for 4 pseudonymous hospitals. The safe practice score was defined as indicating how well a hospital followed procedures that can reduce infections and specified 100 as the highest possible score. Infection rate and mortality rate were defined as how many people got an infection and how many people got an infection and died while in the hospital, respectively. Infection rates and mortality rates were based on rates given in public reports.[15] Safe practice scores ranged from 79 to 93. These scores were not based on actual data. The report versions varied in: (1) consistency of indicators (same hospital is best across all 3 indicators, versus 1 hospital is best on safe practice score, but a different hospital is best on infection rates and mortality rates); (2) whether the data were presented using words (29 out of 1000 people got an infection) or horizontal bar graphs; and (3) whether confidence intervals were provided. The first variable (consistency of indicators) was included because our in-depth interviews revealed that when consumers were presented with reports that showed inconsistent indicators (based on the Pennsylvania data), they sometimes expressed puzzlement over how this could occur, and prior research has suggested that consumers have difficulty evaluating multiple indicators.[11] Taken together, these findings led us to conclude that it would be important to investigate which indicator consumers based their decisions on in the presence of inconsistent data. The second variable, data presented in bar graphs versus text, was included because there is not yet a clear consensus in the literature on which presentation format is optimal for presenting risk and our in-depth interviews also did not identify which of the 2 approaches is more effective. The third variable (confidence intervals) was included because experts in this area have expressed concern that consumers may draw unjustified conclusions from small differences in rates when the rates are, in fact, based on small samples and have high variability. Experts often use 95% confidence intervals to convey the amount of uncertainty associated with a given estimate. If confidence intervals can be understood by the public, they might help to communicate the uncertainty that is likely to occur in public reporting of institutional-level data. Two additional sections followed the data. Following the mortality rate data was the section "Understanding the Numbers," which provided a lay explanation of
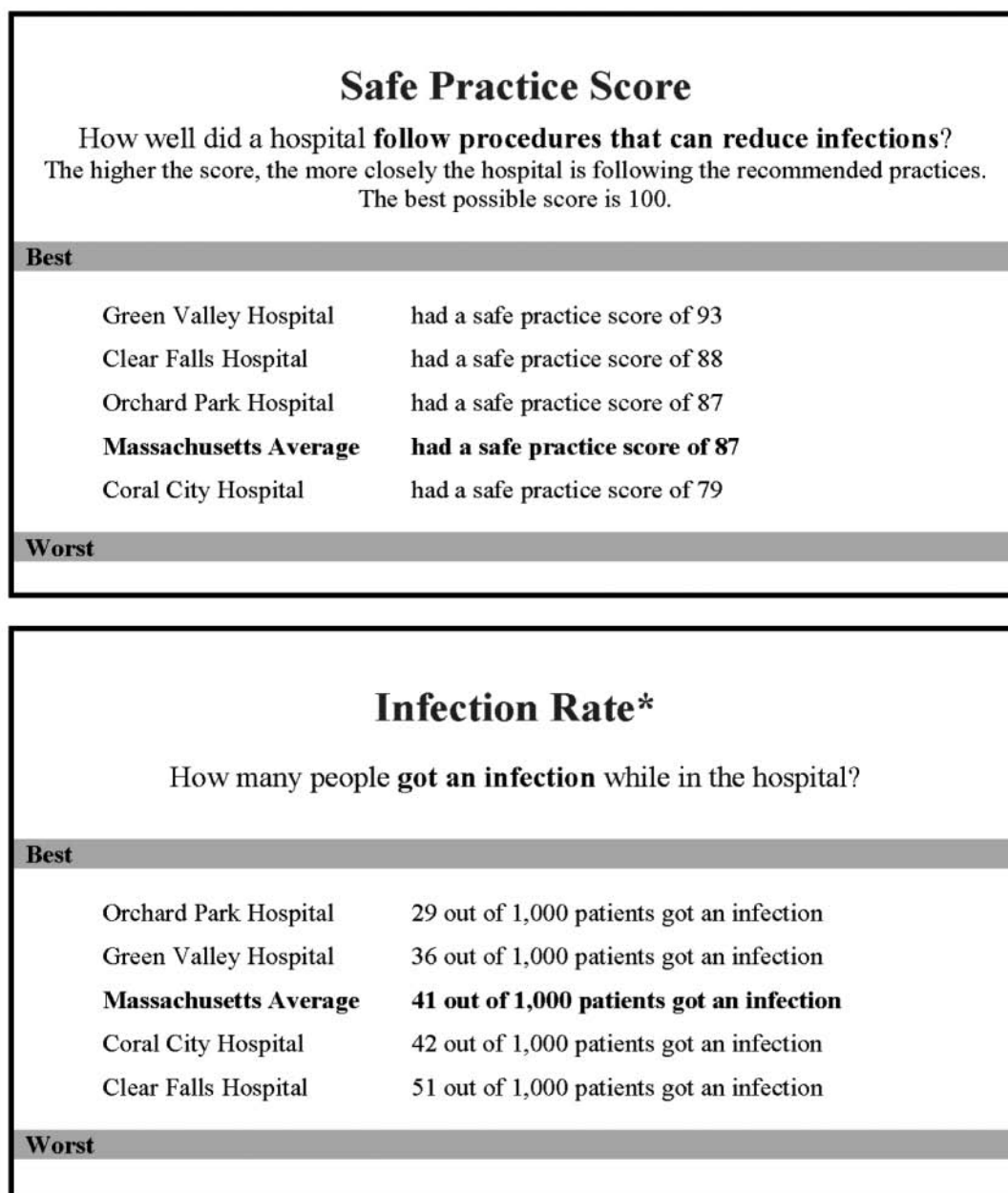
Safe Practice Score

How well did a hospital **follow procedures that can reduce infections**?
The higher the score, the more closely the hospital is following the recommended practices.
The best possible score is 100.

Best

Green Valley Hospital	had a safe practice score of 93
Clear Falls Hospital	had a safe practice score of 88
Orchard Park Hospital	had a safe practice score of 87
Massachusetts Average	**had a safe practice score of 87**
Coral City Hospital	had a safe practice score of 79

Worst

Infection Rate*

How many people **got an infection** while in the hospital?

Best

Orchard Park Hospital	29 out of 1,000 patients got an infection
Green Valley Hospital	36 out of 1,000 patients got an infection
Massachusetts Average	**41 out of 1,000 patients got an infection**
Coral City Hospital	42 out of 1,000 patients got an infection
Clear Falls Hospital	51 out of 1,000 patients got an infection

Worst

Figure 1.   First page from a Word report with inconsistent indicators.

risk adjustment, noted that small differences between hospitals were probably not significant, and provided a lay explanation of confidence intervals for reports that included confidence intervals. The back page section, "More Information on Healthcare-Associated Infections," provided questions and answers about risk, causes of HAIs, ways to reduce risk, and names of common HAIs. An excerpt from one of the reports is provided in Figure 1. Examples of the full reports are available from the author on request.

QUESTIONNAIRE

The 1-page questionnaire included 4 sets of items. The first set assessed the understandability of each report section, using a 5-point Likert scale where 1 = *very hard to understand* and

5 = *very easy to understand*. The second set consisted of 9 items concerning the importance of various influences on hospital choice (eg, "If I needed hospital care, I would decide which hospital to go to based on infection rates"), rated on a 5-point scale where 1 = *strongly disagree* and 5 = *strongly agree*. The third set assessed comprehension of the specific data in the report. Respondents were asked which hospital would be their first choice, which hospital would be their last choice, and whether 2 hospitals in the report were about the same in terms of infection rates. The last section included 5 background questions. Space for comments was provided.

ANALYSIS

All questionnaire responses were entered into the Statistical Package for Social Sciences (SPSS) (SPSS for Windows, 14.0.0, SPSS Inc, Chicago, IL). This program was also used to conduct all analyses. Differences between responders and nonresponders were evaluated using *t* tests (for age) and chi-square statistics (for sex). The impact of the 3 independent variables (consistency of indicators, data presentation, and presence of confidence intervals) on the understandability ratings was tested using *t* tests and multivariate linear regression. The relationship between age and understandability ratings was examined using *t* tests (with age dichotomized into <50 years vs ≥50 years). The relationship between education level and understandability ratings was examined using chi-square statistics (with educational level dichotomized into high school or less vs some college, and understandability ratings dichotomized into very easy to understand vs all other ratings). Regression models also included age and education level as covariates. The impact of consistency of indicators on first and last choice hospital and the impact of confidence intervals on judgments of differences between hospitals was evaluated using chi-square statistics.

RESULTS

A total of 201 usable questionnaires were returned completed; 210 questionnaires were undeliverable or were returned because the addressee was deceased, or disabled and unable to complete the survey; and 389 surveys were returned blank,

Table 1
Respondent Characteristics

Characteristic		N (%)
Age	Mean	51.7
	Range	23–92
Education	High school or less	57 (28.4)
	Some college	64 (31.8)
	4-year college degree or higher	80 (39.8)
Sex	Male	76 (37.8)
	Female	125 (62.2)
Received care at a hospital during the last 12 months	Yes	81 (40.3)
	No	118 (58.7)
	Missing	2 (1.0)
Self or close family member has had an HAI	Yes	61 (30.3)
	No	137 (68.2)
	Missing	3 (1.5)
Total N of Respondents		201

HAI = healthcare-acquired infection.

declined, or did not respond. Considering only those instances in which the questionnaire presumably reached an addressee who was able to respond, the response rate is 34% (201/[201+389]). Considering all selected addresses, the response rate is 25% (201/[201+389+210]). Respondent characteristics are presented in Table 1. Overall, respondents tended to be slightly but not significantly younger than nonrespondents (51.7 years vs 52.1 years; *P* > .05), but were significantly older than those who were unreachable or unable to complete the questionnaire (eg, bad addresses). The average age for those in the latter category was 43.4 years (*P* < .001). Women were more likely to respond than men (39% response rate for women vs 30% response rate for men; *P* < .05). It was not possible to directly examine the relationship between education and response tendency, as information on educational attainment for nonrespondents was not available, but comparison with census statistics for the area suggest that more educated respondents were more likely to respond. Specifically, 39% of respondents age 25 or older reported holding a bachelor's degree or higher, compared to 29% of the general population age 25 or older.[16]

Understandability ratings for each booklet section and the booklet overall are presented in Table 2. Statistical analyses using chi-square statistics to compare understandability ratings across consistency of indicators (same hospital is best across all 3 indicators, or 1 hospital is best on

Table 2

Questionnaire Results:
Understandability of Booklet Sections

| Section Title | Percent Rating Section Very Easy to Understand | | |
| | Highest Level of Education | | |
	High School or Less	At Least Some College	P value
What is an HAI?	56 (32/57)	78 (111/142)	.002
Safe practices	54 (30/56)	66 (93/140)	.093
Mortality rates	57 (32/56)	65 (92/141)	.288
More information on HAIs	50 (28/56)	68 (96/140)	.015
Infection rates	56 (31/55)	64 (90/141)	.334
Booklet overall	50 (28/56)	64 (89/140)	.080
Understanding the numbers	39 (22/56)	60 (84/140)	.009

HAI = healthcare-acquired infection.

safe practice score, but a different hospital is best on infection rates and mortality rates), presentation format (words vs graphs), and confidence intervals (present or absent) revealed no statistically significant differences in ratings for any comparison for any booklet section; all P values were > .30. Linear regression analyses (using age and education level as covariates) confirmed no main effects of any of these independent variables, and no interaction effects; however, education was found to be related to understandability ratings for some sections of the booklet (see Table 2). For all sections, respondents who reported having attended at least some college reported significantly higher understandability ratings than those with less education. No statistically significant effect of age was found. Overall, respondents found the section "Understanding the Numbers" to be the least understandable.

When asked which hospital would be their first choice, a large majority (83%) of respondents who received the report wherein a single hospital had the best ratings for all 3 reported indicators (highest safe practice score, lowest infection rate, and lowest mortality rate) selected the hospital with the best ratings. For participants who received a report in which 1 hospital had the highest (best) safe practice score, but a different hospital had the lowest (best) infection rates and mortality rates, 46% selected the hospital that had the highest (best) safe practice score, and 34% selected the hospital that had the lowest (best)

infection and mortality rates. When asked which hospital would be their last choice, of those who received the report wherein a single hospital had the best ratings across all 3 indicators, 85% indicated that the hospital rated lowest on the 3 measures would be their last choice. However, for those who received a report in which 1 hospital had the highest (best) safe practice score, but a different hospital had the lowest (best) infection rates and mortality rates, 22% indicated that the hospital with the lowest (worst) safe practice score would be their last choice, while 59% indicated that the hospital with the highest (worst) infection rates and mortality rates would be their last choice. Thus, faced with inconsistent data, respondents were more likely to rely on safe practice scores to decide which hospital to choose, but tended to rely on infection rates and mortality rates to decide which hospital to avoid.

Level of education was associated with correctly choosing the best and worst hospitals (the best and worst defined by either safe practice score or infection/mortality rates for reports with inconsistent indicators). Respondents who reported having a high school education or less selected a best hospital 65% of the time, compared to 84% of the respondents with some college or a higher education level (P = .003). This pattern was similar for the worst hospital choice with a correct hospital chosen by 60% and 89% of those with less and more education respectively (P < .001).

Overall ratings of the understandability of the booklet were also associated with the correct choice of best and worst hospitals. Of those who rated the booklet a 4 or a 5 (5 = *very easy*), 83% made a correct choice of the best hospital, compared with 44% of those who gave lower understandability ratings (P < .001). The comparable percentages for correct choice of the worst hospital were 83% and 57% (P = .03).

To examine the effect of including confidence intervals on respondents' judgments about differences between hospitals, respondents were asked to compare 2 hospitals on infection rates and to determine which had the better rate, or whether they were about the same. The inclusion of confidence intervals had no statistically significant impact on participants' reports of perception of a difference between the two hospitals. When confidence intervals were provided, 23% perceived the 2 hospitals as about the same, compared to 21% when no confidence intervals were provided (P > .05).

Respondents' ratings of the factors that might influence hospital choice are presented in Table 3.

Table 3

Questionnaire Results:
Factors Affecting Hospital Choice

Question/Answer	Agreement, %
I would decide which hospital to go to based on . . .	
My own prior experience with the hospital	95
The hospital's reputation	93
My doctor's recommendation	92
Whether my insurance would cover care at that hospital	91
Safe practice score	82
Infection rates	82
Mortality rates	76
Friends' or family members' recommendations	75
The distance from my home to the hospital	65

Percent agreement includes those selecting either "Agree" or "Strongly Agree." N valid responses ranged from 183 to 193.

Overall, respondents appeared to be more influenced by their own prior experience at a hospital than by infection rate or mortality rate.

DISCUSSION

Our findings suggest that public reporting of comparative data on HAIs in hospitals may influence consumers' decisions about hospital choice, but other factors including prior experience, reputation, physicians' recommendations, and insurance coverage are likely to be at least as influential. While hospital leaders may be concerned that public reporting of infection rates and mortality rates could influence potential patients to avoid hospitals with high rates, in fact the actual experiences of patients and visitors may be more important. Not surprisingly, insurance coverage is also extremely important. More than 9 of 10 patients (91%) would be influenced by whether their insurance would cover care at a hospital. One implication of this is that efforts to influence hospitals to improve their infection control practices and outcomes should consider directly targeting insurance purchasers and employers. These stakeholders may be more accessible and more prepared to attend to and evaluate comparative data. However, efforts to inform purchasers must be undertaken thoughtfully. Prior research suggests that purchasers are not always aware of available clinical outcome measures, and even when made aware of the data it may not be in a format that they are able to use to support their decision making.[17]

Overall, a majority of respondents appeared to find the report easy to understand. Between 85% and 90% gave ratings of either 4 or 5 on the 5-point scale where 5 = *very easy*. This suggests that the reports developed for this study would be comprehensible to most members of the public. However, we also found that less educated respondents found the sample reports less understandable than more educated, suggesting that additional work may be needed to further tailor these reports. If there is response bias in our sample, as suggested by the relatively high educational level of our respondents compared to the census statistics for this region, tailoring may be even more important.

The understandability ratings reported in Table 3 indicate that consumers found the section "Understanding the Numbers" less comprehensible than the other sections. This section, which gave a lay definition of risk adjustment and confidence intervals (for those reports with confidence intervals), and noted that small differences are often not meaningful, highlights that technical information is difficult to communicate. Apparently this information must be simplified even further than was done in the reports studied here, or omitted. It is our belief that further simplification of these concepts will be functionally equivalent to omitting this section, as even in the current version very little actual information is conveyed.

The fact that we did not find any statistical evidence of impact of the 3 variations in report design (consistency of indicators, presentation type, or presence of confidence intervals) on any of the understandability ratings is somewhat surprising. While we did not predict which of the 2 presentation types (text or graphic) would be perceived as more understandable, we did predict that reports with confidence intervals would be more difficult for respondents to understand and that lack of consistency across indicators would also increase difficulty because consumers have difficulty weighing quality measures.[11] The fact that the vast majority of respondents, overall, correctly selected a hospital that would either maximize safe practice scores or minimize infection and mortality rates suggests that they were able to correctly interpret the data presented regardless of report version.

One of the most interesting findings of this study is that respondents appeared to be more influenced by safe practice scores than infection and mortality rates when deciding which hospital

they would choose and that the opposite was true when deciding which hospital to avoid. This is consistent with prior work on how choices are framed, which revealed that people have a tendency to seek gains (safe practices) and avoid losses (infection rates and mortality).[18]

This study has a number of limitations. First, while mailing to a random sample of local residents maximized the ability to include people from diverse backgrounds, the response rate was less than ideal. However, relatively low response rates are not uncommon in surveys of the general public. For instance, in a recent national survey of attitudes toward HAIs, McGuckin et al achieved a response rate of 16%. Our respondents were more educated than the general public in our geographic area. This does not negate our finding that educational level was associated with differential responses to the booklet, and in correctness of choices of best and worst hospitals. However, it does suggest that the general public might find materials such as these less understandable than the respondents in our sample found them. Clearly, the educational level of the intended audience should be considered when developing materials for consumers. Another factor that may have influenced our results is respondents' level of interest in the topic. In a related qualitative study[14] interviewees reported that they would most likely pay attention to performance reports of this type if they perceived the information to be directly relevant (ie, if they or a close family member were scheduled to go to a hospital, or had recently been in a hospital). It is possible that respondents to this questionnaire may have been more interested in the topic than nonrespondents, which could in turn influence their ratings of and responses to the reports.

In summary, it appears that most consumers feel able to understand information on HAIs, including comparative data on process measures, infection rates, and mortality rates, when it is presented in a short, simple report. Similarly, most are able to correctly select the best or worst hospital using either text or graphic presentation of data. Including confidence intervals appears to have no impact on consumers' understanding of the data or their perceptions of differences. Thus, the findings reported here contribute to the foundational knowledge that is needed to develop useful, comprehensible public reports of comparative HAI data. Additional work is needed to improve the reports so that they are comprehensible across all educational levels.

REFERENCES

1. Marshall MN, Shekelle PG, Leatherman S, Brook RH. The public release of performance data: what do we expect to gain? A review of the evidence. *JAMA*. 2000;283:1866-1874.

2. Fung CH, Lim YW, Mattke S, Damberg C, Shekelle PG. Systematic review: the evidence that publishing patient care performance data improves quality of care. *Ann Intern Med*. 2008;148:111-123.

3. Marshall MN, Shekelle PG, Davies HT, Smith PC. Public reporting on quality in the United States and the United Kingdom. *Health Aff (Millwood)*. 2003;22:134-148.

4. Hibbard JH. What can we say about the impact of public reporting? Inconsistent execution yields variable results. *Ann Intern Med*. 2008;148:160-161.

5. Hibbard JH, Stockard J, Tusler M. Hospital performance reports: impact on quality, market share, and reputation. *Health Aff (Millwood)*. 2005;24:1150-1160.

6. Hibbard JH, Stockard J, Tusler M. Does publicizing hospital performance stimulate quality improvement efforts? *Health Aff (Millwood)*. 2003;22:84-94.

7. Hollenbeak CS, Lave JR, Zeddies T, Pei Y, Roland CE, Sun EF. Factors associated with risk of surgical wound infections. *Am J Med Qual*. 2006;21:29S-34S.

8. Peters E, Hibbard J, Slovic P, Dieckmann N. Numeracy skill and the communication, comprehension, and use of risk-benefit information. *Health Aff*. 2007;26:741-748.

9. Schwartz LM, Woloshin S, Welch HG. Can patients interpret health information? An assessment of the medical data interpretation test. *Med Decis Making*. 2005;25:290-300.

10. Jewett JJ, Hibbard JH. Comprehension of quality care indicators: differences among privately insured, publicly insured, and uninsured. *Health Care Financ Rev*. 1996;18:75-94.

11. Hibbard JH, Slovic P, Peters E, Finucane ML. Strategies for reporting health plan performance information to consumers: evidence from controlled studies. *Health Serv Res*. 2002;37:291-313.

12. McKibben L, Fowler G, Horan T, Brennan PJ. Ensuring rational public reporting systems for health care-associated infections: systematic literature review and evaluation recommendations. *Am J Infect Control*. 2006;34:142-149.

13. McGuckin M, Waterman R, Shubin A. Consumer attitudes about health care-acquired infections and hand hygiene. *Am J Med Qual*. 2006;21:342-346.

14. Mazor KM, Dodd K. A qualitative study of consumers' views on public reporting of healthcare-associated infections. *Am J Med Qual*. In press.

15. Pennsylvania Health Care Cost Containment Council. PHC4 Web site. http://www.phc4.org. Accessed

16. US Census 2006 American Community Survey Data Profile Highlights. Worcester City, MA, Worcester, MA Metropolitan Statistical Area Selected Social Characteristics in the United States: 2006 Data Set: 2006 American Community Survey: American Community Survey. Retrieved Feb 14, 2008. http://factfinder.census.gov/servlet/ADPTable?_bm=y&-context=adp&-qr_name=ACS_2006_EST_G00_DP2&-ds_name=ACS_2006_EST_G00_&-tree_id=306&-redoLog=true&-_caller=geoselect&-geo_id=31200US493402582000&-format=&-_lang=en

17. Hibbard JH, Jewett JJ, Legnini MW, Tusler M. Choosing a health plan: do large employers use the data? *Health Aff*. 1997;16:172-180.

18. Rothman AJ, Salovey P. Shaping perceptions to motivate healthy behavior: the role of message framing. *Psychol Bull*. 1997;121:3-19.